



29th GENERAL MEETING

GRASSLAND AT THE HEART OF CIRCULAR AND SUSTAINABLE FOOD SYSTEMS

JUNE 26-30, 2022 • CAEN, FRANCE



Grassland at the heart of circular and sustainable food systems

Edited by

L. Delaby
R. Baumont
V. Brocard
S. Lemauviel-Lavenant
S. Plantureux
F. Vertès
J.L. Peyraud



Volume 27
Grassland Science in Europe

Grassland at the heart of circular and sustainable food systems

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Proceedings of the 29th General Meeting of the
European Grassland Federation
Caen, France
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Published by

The Organising Committee of the 29th General Meeting of the European Grassland Federation, INRAE, Paris, France

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ISBN: 978-2-7380-1445-0 / EAN: 9782738014450

eISBN: 978-2-7380-1446-7 / eEAN: 9782738014467

Abstract submission and evaluation by



Editing and production by

Wageningen Academic Publishers
P.O. Box 220
6700 AE Wageningen
The Netherlands
www.WageningenAcademic.com



Distributed by

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Foreword

We would like to welcome all delegates of the European Grassland Federation 29th General Meeting to Caen, France. The previous EGF General Meeting held in France took place in La Rochelle in 2002. During these last two decades, food systems have been increasingly challenged for their impacts on climate change, loss of biodiversity and other environmental issues, while at the same time the question of food security in Europe is being raised together with successive health and political crises. Therefore, the main theme of the EGF 2022 General Meeting is *Grassland at the heart of circular and sustainable food systems*. This EGF meeting will consider the contributions of grasslands to the development of circular, healthy and sustainable food systems. Grasslands are widely acknowledged for their role in preserving natural resources and biodiversity and in soil carbon sequestration, but at the same time ruminants, the livestock that are used to manage and utilize grassland for food production, are blamed for their emissions of methane and their inefficient use of resources. As the expectations regarding food systems are multi-faceted and because the importance of each service provided by grasslands varies according to the stakeholder's visions, local context and farming practices, achieving the objectives requires the search for new compromises. The analysis of the relationship between services, their drivers encompassing economic, social, biological and biotic regulatory processes and the search for compromises will be the keystone of this meeting.

The meeting has five themes: (1) Putting grasslands into perspective; (2) Highlighting the bundles of services provided by grasslands; (3) Using biodiversity to reduce vulnerability and increase resilience of grassland-based systems; (4) Looking for synergy between animals, grasslands and crops; (5) Illustration of initiatives for the transfer and co-construction of innovations on and for grassland.

There are five mid-conference tours organized in Normandy to discover the high value habitats and attractive landscape of wet grasslands, the dairy and beef production from grassland-based systems, and the diversity of animal-based products derived from grassland. In addition, there is a visit to a horse farm as Normandy is the primary French region for horse breeding. The post-conference tour will visit Omaha beach and an impressive American cemetery, the Mont St Michel Bay with an amazing crossing of the bay by foot, sheep flocks grazing on salt-marsh grassland, and a visit to the old city of Rennes.

The General Meeting is organized by INRAE and the University of Caen Normandy. They develop a wide range of research projects including ecology, plant and animal science, environmental and social sustainability, grassland and grazing management, system analysis and whole value chain perspectives.

We would like to thank all authors for their contributions, numerous reviewers for their valuable remarks which have helped to ensure the high quality of the papers presented, the members of the scientific and organizing committees, the secretary of EGF, and our sponsors and all delegates attending the conference.

We wish that the 29th General Meeting of EGF will provide novel insights for grassland science and stimulate fruitful discussions and networking and that all participants will have enjoyable days in Normandy.

Dr Jean-Louis Peyraud

*President, European
Grassland Federation*

Luc Delaby

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*Secretary
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Sustainable management model for the preservation of valuable open mountain areas: the Open2preserve project

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Abstract

In south-western Europe, the abandonment of traditional practices in mountains is causing a homogenization of the landscape and an increased risk of extreme wildfires, endangering ecosystems of high ecological value. The Interreg Sudoe Open2preserve project (2018-2021) aimed to develop a sustainable management model based on the principles of the pyric herbivory (combination of prescribed fires and targeted grazing) to preserve a mosaic of open landscapes in abandoned and high fire-prone areas. Thirteen partners from Spain, France and Portugal established eight pilot experiments in protected areas of contrasting environments in the SUDOE region (Atlantic mountains, Pyrenees, and Mediterranean areas). In these pilot experiments, we implemented a common management and monitoring design based on an initial removal of biomass and a multi-year targeted grazing with autochthonous horses and sheep. We monitored the intensity and severity of the burnings, the livestock welfare, the vegetation dynamics, and the soil function for two years, and tested drone and GPS technological tools. This multidisciplinary and international project gathered the main bases to implement pyric herbivory practices on mountain grasslands valuing prescribed burnings and targeted grazing, which promote the preservation of biodiversity and resilient ecosystems, while ensuring the environmental, social and economic sustainability of these practices.

Keywords: knowledge transfer, pyric herbivory, mountain grasslands, native livestock breeds, technological tools

Introduction

In south-western Europe, the abandonment of traditional management in mountain grasslands and the decrease of livestock grazing is causing the expansion of native woody plants, the homogenization and loss of diversity of the landscape and the accumulations of biofuels, increasing the risk of extreme wildfire events (Múgica *et al.*, 2021) and endangering ecosystems of high ecological value. Appropriate management of pyric herbivory, the spatial and temporal interaction of fire and grazing (Fuhlendorf *et al.*, 2009), should be restored in this region to preserve the ecosystem services associated with these pastoral systems. Despite its interest, the traditional knowledge of these practices has been lost in many areas (Fernández-Giménez and Fillat, 2012), and new research is needed to establish the guidelines for an adequate management adapted to the new global change scenarios. This is the framework in which

the Interreg-Sudoe project Open2preserve ('Sustainable management model for the preservation of open mountain areas with high environmental value', <https://open2preserve.eu/en/>) arose, aiming to develop a sustainable management model based on the principles of the pyric herbivory, combining prescribed fires and targeted grazing to preserve a mosaic of open plant communities in abandoned mountain regions of SW Europe.

Materials and methods

The project Open2preserve started in March 2018 and finished in December 2021. Project partners from Spain, France and Portugal established in their territories eight pilot experiments (PE) in representative, valuable mountain areas of temperate and Mediterranean environments. The eight study regions shared a similar socioeconomic situation derived from the abandonment of extensive ranging and traditional use of the mountain resources, but they differed in their climatic, geological and topographic conditions and developed a different type of dominant vegetation. We implemented in all PE a common management protocol, which was based on an initial removal of lignified biomass by prescribed burning (except in a PE where mechanical clearing was carried out due to climatic constraints), and a subsequent targeted grazing with animals of autochthonous breeds (equine and ovine mainly) during the following two years (Table 1). First, we analysed the state-of-art of pyric herbivory in south-Europe and then we compiled the lessons learned during the implementation of the PE, information that is presented in the results section. For two years we monitored the implemented practices (burning and grazing) and studied their effects on the environment (soil and vegetation) while ensuring conditions of animal welfare (body condition and weight) in the pilot experiments. In addition, the project tested new technological tools for livestock monitoring (GPS) and for surveys of fuel and burns (by drone flights). The vegetation dynamics was monitored by field surveys (floristic inventories, biomass measurements) and by drone images to determine shrub regrowth and floristic diversity. Soil physical, chemical and biological properties were also measured in six of the PE to determine the burning and grazing effects in the short and the mid-term.

Results: state-of-art in south-Europe and lessons learned from the project

The legislation of each region, the meteorology and the people-training capacity are the factors that determine the potential of a given region to execute prescribed burnings with environmental and preventive purposes in SW Europe. In the early eighties, the first countries that developed fire-use policies and burning by specialized teams were Portugal and France, and Spain progressed in the same direction afterwards (Canals, 2019). Nowadays, the legislation on fire is inconsistent among regions, and different situations occur, from the prohibition to the promotion of technical burns. When permitted, a strict calendar for the implementation of burns must be respected, constraining them to late autumn and early spring (the cold and rainy period of the year). Regulations also indicate which personnel are allowed to do the burns, after requesting permission from the authorities, and establish an accurate burning action protocol to avoid fire outbreaks. In all cases, burns must be applied under specific meteorological

Table 1. Location of the eight pilot experiments of the project and the applied treatments.

PE	Location	Initial treatment	Livestock specie/Breed
PE-1	Aquitania	Burning	Sheep/Basco Béarnaise
PE-2	Navarra	Burning	Horses/Burguete
PE-3	Galicia	Burning	Horses/Caballo Gallego
PE-4	Trás-os-Montes	Mechanical clearing	Sheep/Churra Galega Bragançana
PE-5	Vila Real	Burning	Horses/Garrano
PE-6	Andalucía	Burning	Sheep/Segureño
PE-7	Cataluña	Burning	Sheep/Ripollesa
PE-8	Easter Pyrenees	Burning	Autochthonous sheep and cattle



conditions that enable the control of flames: low environmental temperature, low wind speed and high soil humidity are the most important. These environmental conditions ensure burns of low intensity. Despite high flame temperatures (e.g. >700 °C) being reached at certain moments, and at ground surface (e.g. >300 °C), changes in topsoil temperature are hardly observed, indicating that these burnings are not at all comparable to wildfire events (high temperatures maintained over time, e.g. >800 °C).

The project also highlights the importance of operating in small (but well-selected) areas through a multi-year grazing plan to increase the efficiency and to obtain the desired objectives of consolidating mosaic landscapes. The animals selected for this environmental grazing must be robust (native breeds) and respond to a particular physiological state of low energy needs, to ensure their physical well-being and their tolerance to stressful situations. Two main different grazing management strategies, which depended on the domestic herbivore, arose as particularly successful in this project (Table 1): medium-sized (less than 700 animals) sheep flocks guided by a shepherd which grazed in a large area that included the pilot plot (of around 2-6 ha) according to a previously established itinerary; and small herds of equines (around 5 mares) that rotated between different fenced plots (of around 2-3 ha plot⁻¹) during selected periods of the year considering the animals' needs, the biomass offer of grasses and the shrub resprout. In addition to a shepherd or fences, implementing a targeted grazing implies the establishment of mobile water points and food baits to supplement animal's diet and to increase the pressure of the herbivore in the avoided areas.

Conclusions

The practice of the pyric herbivory is a useful tool to be applied in particular areas of the territory, i.e. critical points for wildfire extinction and wild-urban interfaces. This multidisciplinary project established the basis of a suitable use of the pyric herbivory in SW Europe for the purpose of maintaining the biodiversity of abandoned mountain grasslands while generating resilient landscapes facing the current risks of the global change.

Acknowledgements

Open2preserve Project (SOE2/P5/E0804) was funded by the Interreg Sudoe Programme, the European Regional Development Fund of the European-Union. The authors are grateful to the rest of the partners and participants of the project.

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